

5 Fixed Gear Sampling



Focus Questions:

- What is a fixed gear vessel and how does it operate?
- How are data collected on fixed gear vessels and what forms are used?

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I. Introduction

Thirty percent of WCGOP Observer days are spent on fixed gear vessels. These vessels target sablefish, thornyheads, rockfish, cabezon, lingcod, and a variety of other nearshore species. Fixed gear catch is generally more homogeneous, with only the target and a few bycatch species being caught on a set. Trips aboard fixed gear vessels range from one to ten days.

II. Diversity of Fleet and Effects on Sampling

The fixed gear fleet on the West Coast is very diverse. Therefore, there are two manual sections, Chapters 5 and 6, devoted to sampling on fixed gear vessels. Observer sampling aboard all fixed gear vessels follows a consistent protocol. However, characteristics including vessel size, fishery participating in, and average landing weight affect Observer sampling. Below is a list of characteristics that influence catch sampling. Under each characteristic is an explanation of what is covered in manual chapter 5 versus chapter 6.

Fixed gear vessels range in size from kayaks to 70'.

- **Size** – Although the amount of catch on fixed gear vessels is usually small, limited deck space may cause difficulties when sampling. Lack of storage space for catch can affect sample size and often there is not room for a platform scale, making it necessary to rely on hand scales.
 - **Chapter 5** – Generally vessels ranging in size from 35 feet to 70 feet. Platform scale can be used.
 - **Chapter 6** – Generally vessel ranging in size from kayaks to 35 feet. Platform or hand scales might be used.
- **Landing Weight** – The majority of fixed gear vessels participate in the open access portion of the

Fixed gear vessels land between 50 lbs. and 10,000 lbs. per trip.

fishery. Open access vessels may catch less than 100 pounds of fish per day. However, there are also Limited Entry fixed gear vessels that land thousands of pounds per trip.

- **Chapter 5** – Generally land over 1500 lbs in a single delivery
- **Chapter 6** – Generally land 50 to 500 lbs in a single delivery

Conventional longline gear may or may not have distinguishable gear units. Check with skipper prior to first haul.

- **Gear** – There are many gear types employed in the West Coast Fixed Gear fisheries.

- **Chapter 5** – Conventional longline and strings of pots.
- **Chapter 6** – Vertical Longline (Portuguese set), Stick, Cable, Troll, Rod-and-Reel, and individual Pots or Traps.

Sometimes, weighing retained fish in the live fish and other fisheries is impossible.

- **Live vs. Dead** – Many vessels participate in the live fish fishery. Skippers vary on their willingness to have the Observer weigh live retained fish. In a number of fisheries, including the live fish and dory fleets, discard is frequently released alive. This requires the Observer to be conscientious about not increasing the mortality of discard.

- **Chapter 5** – Dead fish fishery
- **Chapter 6** – Live or dead fish fisheries

Total # of Hooks for the Trip Form = the total number of hooks or pots for that set

- **Total # of Hooks** – Counting hooks can be tricky. On certain gear types, this means not only counting the number of hooks/skates/poles/tubs/etc. but also counting the number of times each skate/pole/tub/etc. is brought above the waterline.

- **Chapter 5** – Over 1500 hooks set in a day. Conventional longline and strings of pots. Large sections of gear retrieved in sets with discernable start and end points.
- **Chapter 6** – Vertical Longline (Portuguese set), Stick, Cable, Troll, Rod-and-Reel, and

individual Pots or Traps. Fewer total hooks fished. Small sections or pieces of gear set and retrieved repeatedly throughout day.

- **Sets** – Longline gear or strings of pots are easily defined as a set. However, in many of the other fisheries defining a set is difficult. In these fisheries sets are often defined by geographic area, depth, gear type, and species composition. If none of those factors change during a day of fishing, then all gear pulled that day is considered one set.
 - **Chapter 5** – Easily defined sets with clear start and end buoys.
 - **Chapter 6** – Small sections or pieces of gear set and retrieved repeatedly throughout day. Sets are often determined by location, depth and time.

III. Fixed Gear and Fishing Strategy Descriptions

Longline Gear

Groundline/Mainline-

The length of line to which all of the hooks are attached. This line is the “backbone” of the longline gear.

Gangion-

The length of line that connects the hook to the groundline. It is often one to two feet long.

Skates/Tubs – A segment of longline gear. Skates/tubs are tied together to form a set.

This gear type involves the setting out of a long horizontal line (**groundline/mainline**) to which other short lines (**gangions**) with baited hooks are attached. The groundline is secured between anchored lines and identified by floating surface buoys, bamboo poles, and flags. The groundline is laid along or just above the ocean floor (bottom longline) (See Figure 5-1).

Longline fishers usually further divide their gear into smaller segments in order to handle it aboard the vessel. A “set” consists of several segments of gear with the groundlines tied to one another. Segments of gear are usually referred to as **skates** or **tubs**.

Block- A hydraulically driven wheel into which the groundline is placed during gear retrieval. As the wheel spins the groundline is drawn aboard.

Rollerman – A crewman who stands where the fish are coming in and brings them aboard using a gaff. The rollerman lands any commercially valuable fish and excludes any non-commercially valuable fish from being landed.

Crucifier- A pair of rollers or steel pegs which stand vertically with only enough room for the groundline to pass between. During gear retrieval, the groundline passes between the rollers and the hooks are pulled out of the fish.

To deploy longline gear, the vessel sets the first anchor and then steams ahead, following a selected pathway with the groundline and baited hooks being set off the stern of the boat. Hooks are usually baited by hand with squid, herring, octopus, or cod. Hooks of various sizes are attached to gangions of various lengths that are tied on or snapped onto the line at desired intervals. Hook size and spacing, depth, and soak time (fishing time) vary.

Longline gear is retrieved by pulling in the groundline and landing one gangion and hook at a time. On most longliners (See Figure 5-2), the vessel pulls the buoy aboard then pulls up the anchor using a **block**. The **rollerman** transfers the groundline to the block and begins hauling the groundline. The line comes in over the rollers, through the **crucifier**, over the block, and then is coiled. A rollerman stands at the railing of the vessel and helps the fish aboard. Some longliners on the West Coast manually pull the buoy, anchor and groundline aboard. Sablefish, Pacific halibut, spiny dogfish, and other groundfish are often targeted with longline gear.

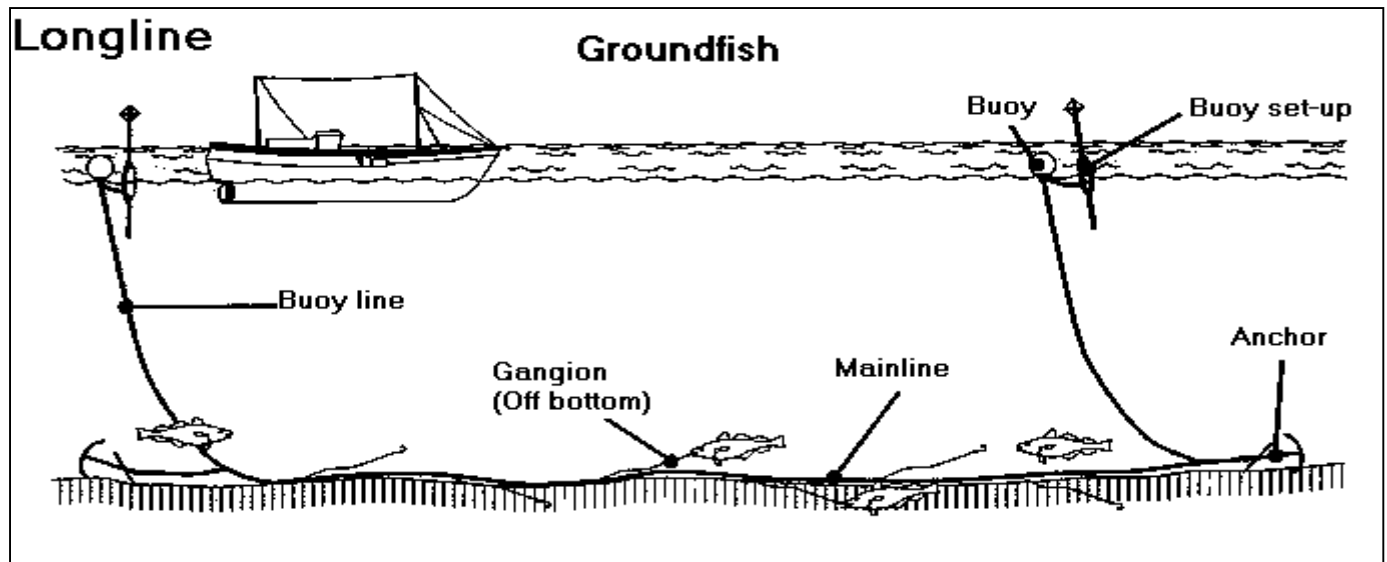


Figure 5 -1: Longline Gear Set-Up

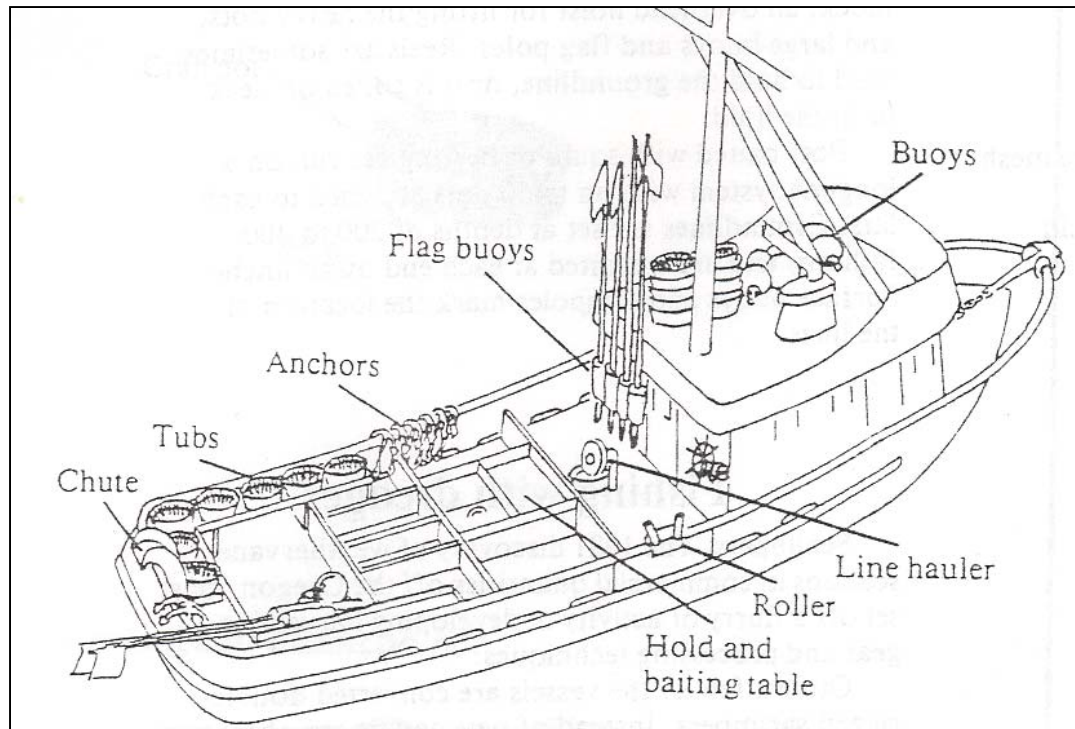


Figure 5 - 2: Longline Vessel

Snap Gear

Snap, or tube, gear is a variation on longline gear. On snap gear, the gangions are “snapped” onto the groundline as it is being set. The gangions are typically garden hose but monofilament line is also used. Snap gear does not have skates, which is the most significant difference between it and conventional longline gear.

Boats that use this gear type typically have a large drum on the back of the vessel that carries all the groundline. They set just as conventional longliners but typically have a tub of baited up gear on the stern and snap on the tubes as the gear is being set.



Pots

The words “pot” and “trap” are used interchangeably to mean baited cages set on the ocean floor to catch fish and shellfish. They can be circular, rectangular or conical in shape. The pots may be set out individually or as strings with multiple pots attached to a groundline. Larger vessels tend to set gear in strings of pots (Chapter 5) whereas smaller vessels typically set traps individually (Chapter 6). All pots contain entry ports and escape ports that allow undersized or unwanted species to escape. Additionally, all pots must have biodegradable escape panels or fasteners that prevent the pot from continuing to fish if lost.

Strings of pots are marked at each end with a pole and flag, and sometimes a light or radar reflector. Individual pots are marked with surface buoys.

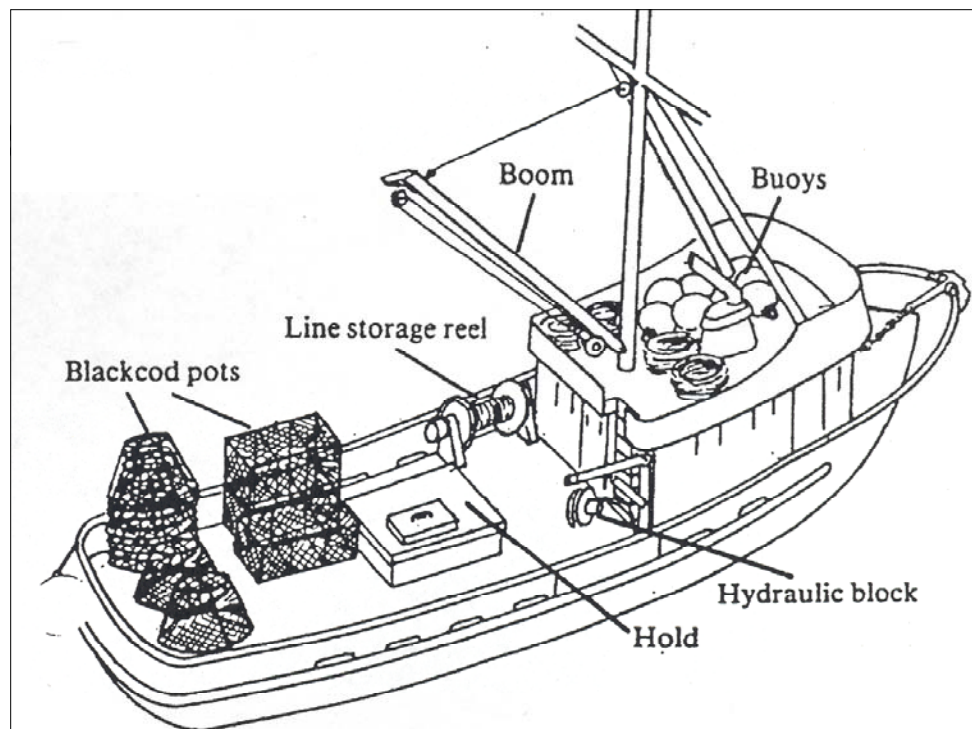


Figure 5 - 3: Trap Vessel

Sablefish Pots



Sablefish pots are fished in strings weighted with anchors at each end and marked at the surface with buoys and flagpoles. The pots are rectangular, trapezoidal, basket, or cylindrical in shape and usually weigh less than 50 pounds (See Figure 5-4). Basket-shaped pots have collapsible bottoms so more pots can be stacked on deck. Pots are set and retrieved using line haulers, hydraulic blocks and overhead hoists. Pots are baited with squid, hake, or herring.

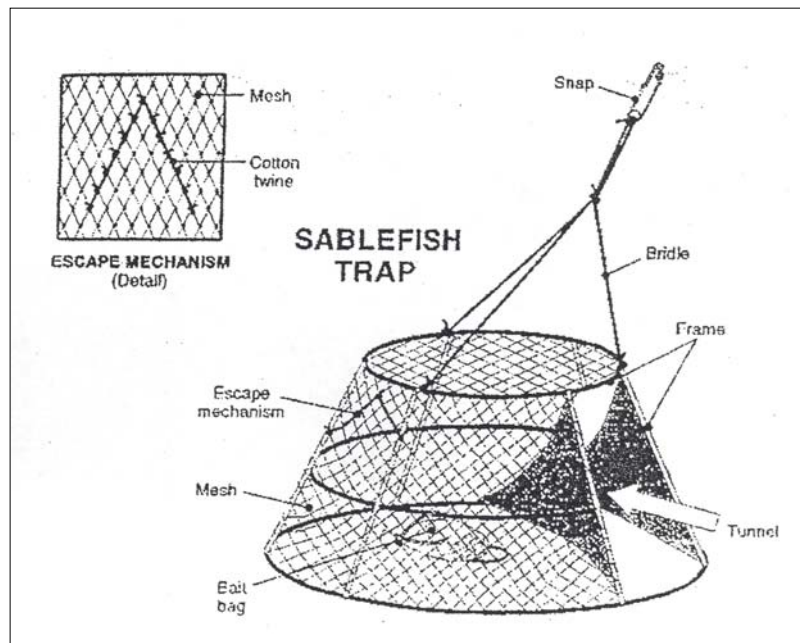


Figure 5 -4: Sablefish Trap

Operations of a Fixed Gear Vessel

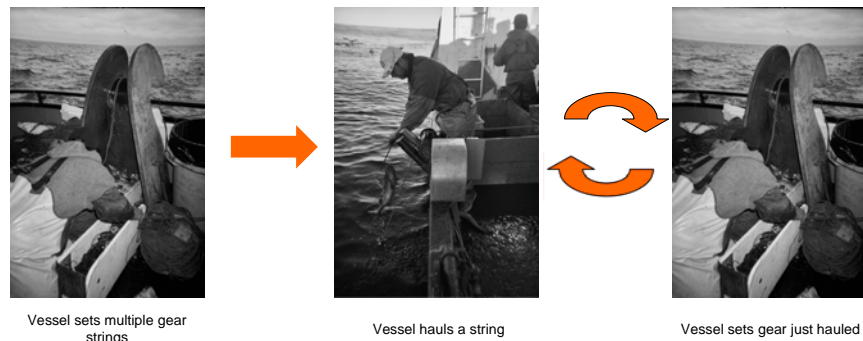


Figure 5 - 5: Operations of a fixed gear vessel

Safety Concerns on Fixed Gear Vessels

There are several safety concerns on fixed gear vessels of which Observers should be especially aware. Remember: Safety First!!

It may be necessary to sample near the roller station or the block where moving hooks or pots pose a serious threat. It is not uncommon for crewmembers to be seriously injured by incoming and outgoing hooks or pots. If a moving length of line becomes entangled around a leg or an arm, the line can drag a person overboard or into machinery.

While aboard pot vessels, Observers should be conscious of their surroundings at all times. Be aware of coils of line attaching the buoys to the pot. These are deployed as the pot is launched and have been known to wrap around ankles and drag crew overboard.

Lastly, decks are often awash with water, fish entrails, and whole fish, making them very slippery. In order to reduce the risk of injury, always be conscious of dangers in the immediate area.

IV. Data Collection on Fixed Gear Vessels

There are six fisheries that may use conventional longline and pot strings.

Sablefish Endorsed (limited entry)*
 Non-Sablefish Endorsed (limited entry)*
 OR Nearshore (open access)
 OR Rockfish (open access)
 CA OA Fixed Gear (open access)
 CA Nearshore (open access)

*Most commonly use conventional longline and pot strings. Other fisheries often use gear discussed in Chapter 6.

Managers have the same data needs for fixed gear vessels as they do for trawl. Due to differences in sampling protocols, the data flow (how you sample and the order in which forms are completed) of fixed gear is different than trawl. The data flow for sampling fixed gear vessels is:

1. Defining a Set
2. Determining Amount of Gear in a Set
3. Tally Sampling
4. Recording Fishing Effort Information and Total Catch Estimates

The first thing to do when you board a fixed gear vessel is to determine how many hooks or pots the vessel is going to fish with during the trip. Ask the skipper what the normal operation is, if they haul-set, haul-set, haul-set or if they set, set, haul, haul, haul. This will help you determine how much of each set you can sample.

V. Defining a Set

Defining a set on conventional longline and pot gear is straightforward. A set begins at a buoy and ends at a buoy. The set includes all of the hooks or pots in between the two buoys.

Generally, conventional longline sets have thousands of hooks and span two or more miles. Pot strings range from 10 to 50 pots per string. All the hooks or pots set together in a string, even those lost prior to retrieval, are considered a set.

VI. Determining Amount of Gear in a Set

In order to devise an appropriate sampling frame, you must determine the amount of gear in the set prior to the haul. There are two types of longline gear. The first type of gear has no divisible units, rather one long line with hooks. An example of this type of gear is snap gear. The second type is gear that can be divided into units, called skates. Vessels fishing with skate gear can vary how many hooks are fished in each set by increasing or decreasing the number of skates. Interview your captain to determine whether or not the gear is divisible into skates.

Two pieces of information are the foundation for fixed gear sampling:

- Total number of hooks or pots in a set
- Number of hooks or pots sampled

These must be determined for each set.

Vessels using pot, snap longline or other gear that is not divided into skates.

To determine the number of hooks set, you will need to count all of the hooks or pots in the set. The options for counting hooks, in order of preference, are:

1. Count hooks/pots while they are being baited.
2. Count hooks/pots while the gear is stored on the vessel.
3. Count hooks/pots during gear deployment (the setting of gear).
4. Count hooks/pots while gear is being retrieved on sampled hauls and ask skipper if any gear was lost. This can be extremely difficult, especially when you need to sample for species composition at the same time. Also, counting hooks in the evening, morning, and night can be difficult due to available light.
5. Counting hooks/pots while gear is being retrieved on unsampled hauls. If you do not believe you can obtain an accurate hook/pot count while sampling, then you can take one haul off per day to count hooks/pots. **This only works if all sets have the same number of hooks/pots.**

Vessels using gear that is divided into skates.

Determining the number of hooks set can be easier with this type of gear. There are two things you must determine:

- Average number of hooks per skate
- Number of skates in a set

Average number of hooks per skate:

Vessels generally have a consistent number of hooks per skate. Always document in the Observer Logbook when average hook counts were done and why that time was chosen.

1. Count the number of hooks on a skate for at least **1/5** of the gear being used on each trip. It is usually possible to count hooks while gear is being baited or set.
2. Sum the hook counts for all the skates counted and divide by the number of skates counted to determine average number of hooks per skate.



$$\text{Aver \# Hooks per Skate} = \frac{\sum \text{Hooks Counts}}{\# \text{ of Skates Counted}}$$

Number of skates in a set:

Count the number of skates in a set:

1. During deployment of gear.
2. During retrieval of gear. If skate counts are done during retrieval of gear, ask skipper if any gear was lost. It can be difficult to count the number of skates during retrieval, as skate markers are sometimes hard to distinguish.

If you cannot get an accurate count of the total number of skates set, ask the captain for an estimate. If you need to rely on the captain's estimate, a verification of skates per set must be done once each day. This can be accomplished by counting skates during one of the following times:

1. While gear is being set.
2. After a set is completed and all gear is on board vessel.

3. While gear is being retrieved.

Determining the Total Number of Hooks in a Set



$$\text{Total Hook Count} = (\text{Total Skates}) \times (\text{Ave. Hooks per Skate})$$

Vessels Where Hook Counts Are Impossible to Obtain

There are a few vessels in Southern California fishing longline gear on which it is impossible for Observers to verify hook counts. The following circumstances combine to make counting hooks impossible:

1. All hooks must be tallied. This situation can occur for one of two reasons:
 - Single unit longline gear is being fished.
 - The skate knots marking the break between gear units are not readily discernable during gear retrieval.
2. The number of hooks per gear unit is extremely variable. This makes it impossible to use average hook counts to calculate a total hook count.
3. Vessel is retaining live fish and discarding live fish so the Observer must weigh fish quickly during the retrieval.
4. Gear is baited at an alternate location. Many fishers pay to have their gear baited. After a trip, they give their gear to the baiters who take it to a shop and bait it. When the gear is returned, it's ready to be set.



To determine the number of hooks per skate on these vessels:

1. Ask the skipper after EACH skate/tub how many hooks were on that specific skate/tub.
2. Ask the skipper after EACH haul how many hooks were hauled. This is a way to double-check that the skate counts are correct. If there is a large discrepancy between the count the skipper gave you for each skate/tub and the total count for the haul, interview the skipper further about why this discrepancy occurred.

Refer to the WCGOP Field Manual for more information regarding this method.

VII. Tally Sampling

Tally sampling on fixed gear vessels is conducted as the gear is being retrieved. When tallying on a line vessel, the Observer counts everything that comes up on the line, including drop-offs. When tallying on a pot vessel, the Observer counts all individuals in the pots.

Where to Tally Sample

The tally station is where the Observer stands to count organisms as the groundline or pot is being retrieved. The tally station should be no more than six meters from where the fish are landed and the Observer should have a clear line of sight to the fish as they coming aboard. From the tally station, Observers must be able to clearly identify fish as they come aboard and identify drop-offs.

Equipment Needed

A Fixed Gear Catch form, three to six thumb counters, and a clipboard will be needed. Prior Observers have devised

many innovative techniques to make using multiple thumb counters easier. The most common is to use duct tape to attach multiple thumb counters to a clipboard. Other Observers have used duct tape and line to create thumb counter belts that fit around the waist. Observers should be creative, experiment, and find out what works best.

Tally Periods

When tally sampling, all individuals should be recorded to species. Some species are similar in appearance so it may not be possible to distinguish them to species. Examples of these are Rougheye and Shortraker rockfish or Shortspine and Longspine thornyheads. It is acceptable to tally these species to mixed groups such as Rougheye/Shortraker and Shortspine/Longspine.

Gear that has definable smaller units can be randomly subsampled, while gear that does not have definable smaller units must be 100% tallied. When subsampling, at least 1/3 of the total gear retrieved should be tallied for Species Composition. **Always tally the same number of hooks or pots for all retained and discarded species.**



Tip* Vessels using single unit longline gear are, generally, 100% tally sampled.

Random Sampling Strategies for Fixed Gear

If less than 100% of a set is going to be sampled, a random sampling frame must be designed. There are four choices for designing a random sample frame:

- Systematic Spatial (preferred)
- Random (Non-systematic) Spatial

- Systematic Temporal
- Random (Non-systematic) Temporal

Spatial Sampling

Spatial sampling is gear-based and involves randomly selecting sample units from the set to tally. Fixed-gear vessels routinely set over of a depth gradient or across different bottom types. This means the catch can vary significantly along a set. The best way to account for the variability caused by setting across a depth gradient or different bottom types is to use a systematic sampling frame. Examples of systematic and non-systematic spatial sampling follow:

Systematic Spatial Sampling with Random Start (preferred)

Instructions - Example

1. Define population to be sampled - **A longline set of 100 skates of gear needs to be sampled.**
2. Define your sample frame – **Spatial systematic based on skates of gear.**
3. Define your sample units – **Blocks of 5 skates of gear** (# of gear segments in a sample unit may vary from haul to haul).
4. Number all the sample units in your sampling frame – **Sample units numbered as 1-20** (100 skates of gear in 5 skate increments)
5. Determine how many of the sample units you want in your sample (minimum of 1/3 of set). **Decide you want to sample 1/2 of the string, so need to tally 10 sample units.**
6. Divide the total number of sample units by the number of units you want in your sample. This gives you your value for “n”. **$n = 20/10 = 2$**
7. Randomly select a number between 1 and n. This will be the first sample unit in your sample. **Use random**

number table to select a number between 1 and 2.
Randomly select 2.

8. Sample every n^{th} unit thereafter. **In this example the 'sample units' tallied would be 2, (2+2).... (18+2), so the skates sampled would be (6-10), (16-20),(96-100).**

Random Spatial Sampling (Non-systematic)

Instructions - Example

1. Define population to be sampled - **A longline set of 30 skates of gear needs to be sampled.**
2. Define your sample frame – **Spatial, based on skates of gear.**
3. Define your sample units – **Blocks of 3 skates of gear** (# of gear segments in a sample unit may vary from haul to haul).
4. Number all the sample units in your sampling frame – **Sample units numbered as 1-10 (30 skates of gear in 3 skate increments; (1-3), (3-6), (7-9),.....(28-30))**
5. Determine how many of the sample units you want in your sample (minimum of 1/3 of set). **Decide want to sample 4 of the 10 sample units.**
6. Pick random numbers to choose which units to sample. **In this example generate 4 random numbers between 1 and 10 (the maximum sample unit number) to determine which sample units to tally. Number 3, 7, 9 and 10 are randomly selected.**
7. Tally sample the randomly selected sample units – **Tally sample skates 7-9, 19-21, and 25-30. (Since 2 consecutive sample units, 9 and 10, were randomly selected, the last tally period includes 6 skates.)**

Temporal Sampling

Temporal sampling is time based. In order to use this type of sample system you **must** know the approximate length of time it will take to haul a set. Examples of both systematic and non-systematic temporal sampling follow:

Systematic Temporal Sampling with Random Start

Instructions - **Example**

1. Verify the length of time needed to haul the set by asking the skipper or a crewmember – **Captain tells you it will take 6 hours to haul a string.**
2. Define population to be sampled – **All hooks on the string.**
3. Define your sampling frame – **Systematic temporal, based on units of time.**
4. Define your sample units – **1/2-hour blocks of time** (length of time that defines a sample unit may vary from string to string).
5. Number all the sample units in your sampling frame – **Sample units numbered as 1 – 12 (6 hours in ½ hour blocks; 1-30 min., 31-60 min.331-360 min.)**
6. Determine how many of the sample units you want in your sample (minimum of 1/3 of set). **Decide to sample 1/2 of the string = 6 sample units.**
7. Divide the total number of sample units by the number of units you want in your sample. This gives you your value for “n”. **$n = 12/6 = 2$**
8. Randomly select a number between 1 and n. This will be the first sample unit in your sample. **Use random number table to select a number between 1 and 2. Randomly select 1.**
9. Tally sample the first gear segment that begins in the randomly selected time period and continue tally sampling until the time period has ended **and** you have reached the end of a skate. **Begin tally sampling when crew starts hauling the set and sample until 30 minutes have passed and you come to the end of a skate.**

****Always start the sample at the beginning of a gear segment.** (For longline gear, begin at a skate knot!) Never start sampling in the middle of a gear segment regardless of the timing. If the crew is in the middle of hauling a gear segment when a sampling time begins, wait until the end of that

segment to start sampling and sample for the entire time period. **If the vessel is in the middle of a gear segment when the time period ends, continue to tally sample until the entire segment is on board, even if it means sampling for extra time!****

10. Note how many skates were tally sampled in each tally period so that you can calculate the total number hooks sampled for the set. **(This number will vary depending on length of skates and the speed at which gear is hauled.)**
11. Sample every n^{th} unit thereafter. **In this example the 'sample units' tallied would be 1, (1+2)... (9+2), so the time segments sampled would be minutes (1-30), (61-90),...(301-330).**

Random Temporal Sampling (Non-systematic)

1. Verify the length of time needed to haul the set by asking the skipper or a crewmember – **Captain tells you it will take 4 hours to haul a string.**
2. Define population to be sampled - **All hooks on the string.**
3. Define your sample frame – **Non-Systematic Temporal, based on units of time.**
4. Define your sample units – **20-minute blocks of time** (length of time that defines a sample unit may vary from string to string).
5. Number all the sample units in your sampling frame – **Sample units numbered as 1-12** (4 hours in 20-minute blocks; 1-20 min., 21-40 min.221-240 min))
6. Determine how many of the sample units you want in your sample (minimum of 1/3 of set). **Decide want to sample 5 of the 12 sample units.**
7. Pick random numbers to choose which units to sample. **In this example generate 5 random numbers between 1 and 12 (the maximum sample unit number) to determine which sample units to tally.**

The numbers 3, 6, 8, 10 and 11 are randomly selected.

8. Tally sample the first gear segment that begins in the randomly selected time period and continue tally sampling until the time period has ended **and** you have reached the end of a skate. **Begin tally sampling at the start of the first skate that begins after the crew has been hauling the set for 40 minutes, and sample until an additional 20 minutes have passed and you come to the end of a skate.**

****Start each tally sample with the first gear segment that begins in the randomly selected time period. Always start the sample at the beginning of a gear segment.** (For longline gear, begin at a skate knot!) Never start sampling in the middle of a gear segment regardless of the timing. If the crew is in the middle of hauling a gear segment when a sampling time begins, wait until the end of that segment to start sampling and sample for the entire time period. **If the vessel is in the middle of a gear segment when the time period ends, continue to tally sample until the entire segment is on board, even if it means sampling for extra time!****

9. Note how many skates were tally sampled in each tally period so that you can calculate the total number hooks sampled for the set. **(This number will vary depending on length of skates and the speed at which gear is hauled.)**
10. Sample all randomly selected time periods. **In this example the time segments sampled would be minutes (41-60), (101-120), (141-160) and (181-220).** (Since 2 consecutive sample units, 10 and 11, were selected, the last tally period is 40 minutes long.)

Non-Tally Periods

Non-tally periods refer to the segments of gear or periods of time when the Observer is not counting individuals and gear is being retrieved. The non-tally period on line vessels is used for weighing organisms, measuring retained and discarded species, assessing injuries of Pacific halibut, and performing other duties. On pot vessels, the Observer can often weigh the fish from the sampled pot while the next pot is brought aboard. During “off” pots, the Observer can complete biological sampling or other duties.



TIP* On vessels using single unit longline gear, weighing of individuals occurs at the same time as tally sampling.

Weighing Species on Fixed Gear Vessels

On some fixed gear vessels, it is possible to weigh the entire discard collected during a tally sample. However, in most cases average weights will need to be used for retained species. There are two options for collecting individuals for average weights:

- **During tally period** – The preferred method is to collect individuals during the observed tally period. When individuals are collected during the tally period, it ensures that all the species needed for average weights are present. Collect and weigh, at minimum, 15 individuals of each non-targeted species and 50 individuals of the targeted species.
- **During non-tally period** – The major problem with collecting individuals during the non-tally period is that all species that occurred in the tally sample may not be present. If this happens, visually estimate species weights or use “like sets” to arrive at an average weight. Collect and weigh, at

minimum, 15 individuals of each non-targeted species and 50 individuals of the targeted species.

Random Sampling when Collecting Individuals for Average Weights

There are two methods to use on a fixed gear vessel to randomly collect individuals for average weight determinations. These two methods, random spatial and systematic sampling, are detailed below.

Random Spatial Sampling

Spatial sampling is a good method to use for species caught in **small** quantities.

1. Select gear segments to use for collecting individuals using one of the following two methods:
 - Select all non-tally-sampled gear segments.
 - Randomly select one or more gear segment from the entire set.
2. Collect all individuals.
3. Weigh the collected individuals for average weight determinations.

Example of Random Spatial Sampling

1. The Blue Dragon sets 20 pots.
2. The Observer on the Blue Dragon randomly selects 13 of the 20 pots to tally sample by pulling numbers out of a hat.

3. The Observer uses the remaining 7 pots to collect and weigh individuals for average weight determinations.

Systematic Sampling

Systematic sampling is a good method to use for species caught in **large** quantities and in **live fish** fisheries.

1. Select gear segments to use for collecting individuals using one of the following methods:
 - Select all non-tally-sampled gear segments.
 - Randomly select one or more gear segments from the entire set.
2. Systematically collect a portion of the total number of individuals.
 - Estimate the total number of individuals that will be caught in the sampling frame.
 - Divide the estimated total individuals by the number of fish needed (at least 15) to determine the collection frequency (n).
 - Collect every n^{th} individual beginning with a randomly chosen starting point.
3. Weigh the collected individuals for average weight determinations.

Example of Systematic Sampling

1. The Miss Fish sets a longline with 10 skates.
2. The Observer randomly selects skate 2 for obtaining average weight by selecting a number from a random number table.
3. The Observer estimates that 100 sablefish will be caught in skate 2.
4. The Observer wants to collect 20 sablefish to use for an average weight determination.
5. The Observer determines the frequency to collect sablefish by dividing 100 by 20 to get a collection frequency of 5.
6. The Observer randomly chooses a number between 1 and 5 from a random number table and gets the number 4. Starting at the beginning of skate 2, the Observer collects the 4th fish and then every 5th sablefish after that (9, 14, 19, etc.) until the end of skate 2 is reached..
7. The Observer weighs the sablefish and divides the weight by the actual number of fish collected to calculate the average sablefish weight.

Average Weight Calculations

On Fixed Gear vessels, all species in the tally sample MUST have an actual count. However, not all individuals need to be weighed. For some species, an average weight calculation can be applied.

To determine sample weight:

1. Randomly collect individuals to be weighed
2. Weigh and count individuals.
3. Divide the weight of individuals weighed by the number of individuals weighed and then multiply by the total number of individuals of that species in tally sample.



$$\text{Total Sample Wt.} = \frac{\text{Wt. of subsample}}{\text{\# In subsample}} \times \text{Total \# in Tally Sample}$$



Tip* When doing an average weight calculation, count and weigh as many individuals as possible. At minimum, 15 individuals should be weighed and counted. Count and weigh at least 50 individuals from species that are caught in large quantities.

Using Delivery Weights for Average Weights of Talled Individuals

Because fishers participating in the live fish market are extremely concerned about the condition of their fish, weighing retained individuals may not be possible. If it is not possible to collect and weigh a sample of retained fish for average weights, delivery weights (fish tickets) can be used to calculate the average weights of retained species on these vessels. When using delivery weights:

1. Tally ALL retained individuals by species for every haul.
2. Observe the weighing of the fish by species upon landing, if possible. If not, ask the skipper for a copy or look at the weights on the fish ticket.

3. Calculate average weight of species by:



$$\text{Avg. Species Weight} = \frac{\text{Landing weight of species (lbs)}}{\text{\# Of individuals of species caught during ENTIRE trip}}$$

4. For each haul, calculate the weight of retained species.



$$\text{Species Wt by Haul} = \text{Avg. Species Wt} \times \text{\# of individuals caught in haul}$$

Pacific Halibut

The International Pacific Halibut Commission (IPHC) manages the Pacific halibut fishery. The IPHC sets the total allowable catch of Pacific halibut for both the United States and Canada. Pacific halibut (See Figure 5-6) is a prohibited species in most of the fisheries off Washington, Oregon, and California. It is illegal to retain Pacific halibut on any vessel fishing in the waters off Washington, Oregon, and California unless:

- The vessel is participating in the Limited Entry Sablefish fishery.
- The vessel is participating in a Pacific halibut opener. These openers usually last only a day or two.



Figure 5 - 6: Pacific Halibut

Pacific Halibut in the Composition Sample

Pacific halibut are tallied at the same time as all other species, but the method used for determining their weight is often different than for any other species. Pacific halibut are often too large to obtain an accurate weight with the scales provided, and large individuals may not be brought on board the vessel at all. If the fish are small enough to weigh, it is preferred that individuals be collected for an average weight sample and applied to the tallied number. For situations where this is not possible, the IPHC has developed a length-to-weight table that lists approximate weights of Pacific halibut based on the length in centimeters (see Appendix J). It is acceptable to estimate the weight of Pacific halibut in tally samples using this table. If actual lengths cannot be obtained, it is permissible to use visually estimated lengths.

The following suggestions will help with estimating the length of Pacific halibut (See Figure 5-7):

- Measure the distance from the roller to weld marks on the side of the vessel or the waterline, if weather permits.
- Measure the distance between the gangions on the groundline and measure the length of the gangions themselves. On most longline vessels, the distance between the gangions and the length of the gangions are consistent. During normal operations, the Observer will be able to see the fish being pulled by the groundline and gangion. Estimate the length of the Pacific halibut in reference to the length of groundline between the gangions or the length of the gangion itself.

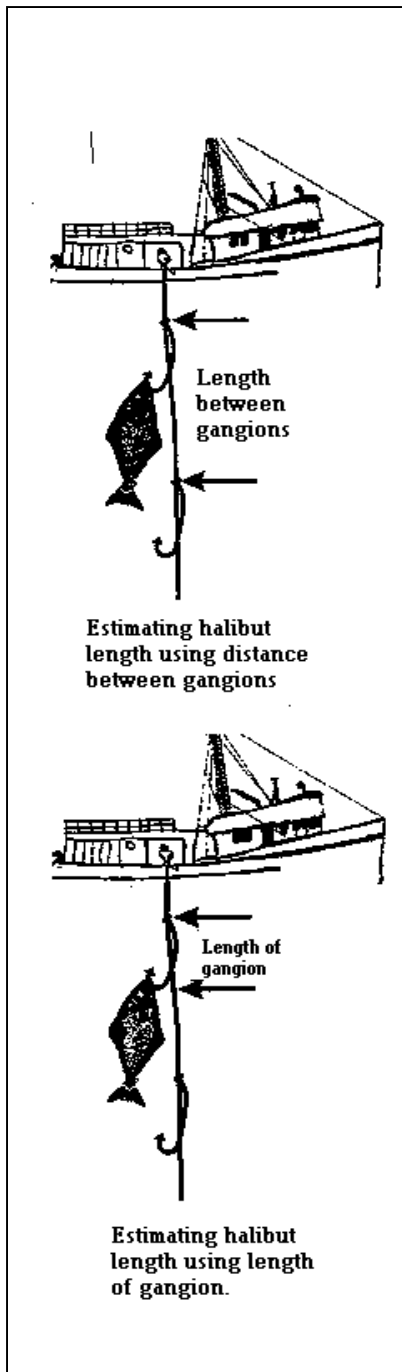


Figure 5 -7: Visuals Length Estimates of Pacific Halibut

- Use the length of the gaff or the pole gaff to compare to the lengths of the Pacific halibut.
- Pre-measure the length of the longline trough. Some Pacific halibut will be brought on board either to be retained or by accident. Having several marked measurements in the trough will allow the Observer to quickly estimate the length of any landed Pacific halibut.
- After sampling a set, use the Length-to-Weight Table in Appendix J to determine proper weights. Multiply the number of Pacific halibut for each length by the weight from the table. Sum the weights for all sizes to obtain the total weight of Pacific halibut in the sample.

Documenting the Tally Sample

The tally sample is normally documented on the back of the Fixed Gear Catch Form, along with the weights of individuals of each species weighed. Once sampling for the haul is complete, the Catch Form and Species Composition Forms can be completed. Unlike trawl, the Species Composition Form is completed prior to the Fixed Gear Catch Form.

Tally Sampling – Step by Step

1. Determine what percentage of gear will be tally sampled.
2. If less than 100% of gear is tally sampled, devise a random sampling frame to determine the gear segments to sample.
3. Count each individual by species that comes up on the line or in the pot, including drop-offs, during sampling frame.
 - Pacific halibut's length should be actually measured or visually estimated during tally sample.
4. Use hand counters or hash marks to count species. Document tally sample on the back of the Fixed Gear Catch Form.
5. Collect and weigh individuals of each species in tally sample and record weights on back of Fixed Gear Catch Form.

Species Composition Form Instructions

Sample Methods

There are two sample methods for species composition sampling on fixed gear vessels.

- ***Sample Method 1 – Whole Haul***

If the Observer weighed 100% of the individuals in the catch category, Sample Method 1 – Whole Haul is used.

- ***Sample Method 4 – Fixed Gear Sample***

If less than 100% of the individuals in the catch category were weighed, Sample Method 4 – fixed gear sample is used.



Tip* Any time average weight calculations are used to determine a species weight, sample method 4 – Fixed Gear Sample should be used on the Species Composition Form. This can be confusing when delivery weights are used because all fish for the trip are actually weighed. However, Sample Method 1 – Whole Haul refers to haul- specific weighing of fish, and can only be used with delivery weights if there is only one haul for the entire trip.

IMPORTANT!!

Discarded and retained individuals are always in separate catch categories. Within either the discarded or retained portion of the tally sample:

- If there are individuals where weights must be visually estimated or Pacific Halibut for which length/weight conversions are done, these individuals are placed in their own catch categories and **are not** recorded on the Species Composition Form.

The species composition information is recorded on the Species Composition Form (See Figure 5-8).

- **Haul Number** – Record the number of the haul that the sample came from.
- **Date** – Record the date as MM/DD/YY.
- **Trip Number** – Record the trip number generated by the database system.
- **Coast Guard Number** – Record the six or seven digit USCG vessel number if the vessel has one. **If the vessel does not have a USCG number, leave entry field blank.**
- **Catch #** - Record the number that corresponds to the catch category on the Catch Form.
- **Sample Method** – Record the method used to sample the catch category.
 - 1 – Whole haul.
 - 4 – Fixed Gear.
- **# Of Baskets** – This field is blank on fixed gear vessels.
- **Catch Category** – Record the catch category in capital letters using the 4-letter PacFin code. For a list of PacFin catch category codes, see Appendix E.
- **KP Weight and KP Number** – Sum up the total weight of all species in the catch category sample and place the total weight in the Keypunch (KP) Weight box. Sum up the total number of all species in the catch category sample and place the total number in the Keypunch (KP) Number box.



Tip* Check to be sure the KP Weight on the Species Composition form is the same as the Catch Category Sample Weight on the Catch Form!! (If not, there is a problem).

- **R or D** – Record whether the catch category sampled was R – Retained or D – Discarded.
- **Species** – Record the common name of the species in the sample. This column must be filled in with the species name. Do not simply enter the species code! The common name listed on the paperwork must match the common name used in the database. See Appendix A - D for a list of species.
- **Species Code** – Record the species code number of the corresponding species. This can be done prior to entering and not on deck. See Appendix A - D for a list of species and species codes.
- **Sample Weight** – Record the total weight of the species in the sample (can be extrapolated).
- **Fish Number** – Record the number of fish of each species in the sample (Can NOT be extrapolated).
- **Reason for Discard** – Record the skipper's/crew's reason of discard for each discarded species.

1 - Prohibited– Only Salmon, Pacific Halibut, and Dungeness crab.

2 - Size – High-graded fish.

3 - Market – Any market driven reason such as size (too big or small), no market, market price is too low, etc.



TIP* Species which are unlikely to be retained, such as eelpouts, sculpins, and

grenadiers are given a reason for discard of '3 - Market'.

4 - Regulation – Any regulatory reason including size, over quota, etc.

5 - Other – Document in comments actual reason for discard.



Tip* Invertebrates such as starfish, anemones, and sea pens are given a reason for discard of '5 - Other'.

6 – Drop-Off - Any fish that would have been retained if it were landed (fish did not make it onto the vessel because it fell off the line).

7 – Predation – Caught fish that are eaten by

- any predator including marine mammals, seabirds, or sand fleas.



Tip* Look only at the primary reason for discard. For instance, if the vessel is not retaining Starry Flounder and one drops-off, do not record the reason for discard as drop-off. Even if it had made it on the vessel, the fish would not have been retained. This also applies to predated fish that drop-off. If a fish that would have been retained drops off because it's been predated, the reason for discard should be predation (even if the fish made it aboard it would not have been retained due to predation).

- **Basket Weight and Number** – Use this column on deck for species with multiple weights. These

columns are not required. Be sure to fill the “Sample Weight” column in with the total weight of the species in the sample only!

[illegible]

Method : 1-Whole haul species 2-Single basket 3-Multiple basket 4-Fixed Gear Sample
Reason for discard: 1-Prohibited 2-Size 3-Market 4-Regulation 5-Other 6-Drop-off 7 - Predation

Species Composition Form v.3
January 2004

Figure 5-8 : Species Composition Form

Fixed Gear Catch Form

Weight Methods Applicable for Catch Categories on Fixed Gear Vessels

As noted earlier, the same 2 rules apply for catch categories on fixed gear vessels as trawlers and prawn vessels.

- Retained and Discarded species must be in separate catch categories.
- Pacific halibut is always in its own catch category.

There are only four weight methods that can be used for Catch Categories on Fixed Gear Vessels. They are:

Weight method 4 – Visual Estimate

Weight method 6 - Other

Weight method 9 – Pacific Halibut Length/Weight

Weight method 13 – Tally Sample

Remember, no matter which weight method is used, actual counts must be obtained for all individuals in the sample.

Weight Method 4 – Visual Estimate

This weight method is used for species that have a count but ONLY a visual weight.

For example: Large skates will usually break the gangions when they leave the water. This means the Observer will not be able to get a weight for large skates and using an average weight from smaller skates would be biased. Therefore, taking a visual estimate of the weight is the best option.

Weight Method 6 – Other

This weight method should never be intentionally used. It creates confusion for end users and debriefers because it does not indicate how the weight was actually derived. If this method is used, document what happened in the Observer Logbook **and** on the paperwork.

Weight Method 9 – Pacific Halibut Length/Weight

This weight method is **ONLY** used for Pacific halibut. Actual lengths or visually estimated lengths can be used.

Weight Method 13 – Tally Sample

This weight method is used for species that are counted **AND** an actual or extrapolated weight has been obtained.

Fixed Gear Catch Form Instructions

The Fixed Gear Catch Form (See Figure 5-9) is used to document sample weight and other catch information. A Catch Form should be completed for all hauls.



TIP* The “weight” column is filled out differently on the Fixed Gear Catch Form than on the Trawl/Prawn Catch Form. For Fixed Gear, the weights recorded are samples weights; for Trawl/Prawn, the weights represent total weight estimates for the catch category.

- **Haul Number** – Record the number of the haul.
- **Date** – Record the date as MM/DD/YY.
- **Trip Number** – Record the trip number generated by the database system.

- **Coast Guard Number** – Record the six or seven digit USCG vessel number if the vessel has one. If the vessel does not have a USCG number, leave entry field blank.
- **Catch #** - Number the catch categories consecutively, starting from 1 for each haul. The numbers on the paper Catch Form must match the numbers assigned by the database when data is entered.
- **R or D** – Record whether the catch category is from **R** – Retained or **D** – Discarded catch.
- **Catch Category** – Record the catch category in capital letters using the 4-letter PacFin code. For a list of PacFin catch category codes, see Appendix E.
- **Sample Weight** – Record the weight of the tally sample for the catch category in pounds.



Tip* If there is a species composition sample for the catch category, the Sample Weight should be the same as the Key punch Weight on the Species Composition Form!! (If not, there is a problem).

- **Numbers of Fish** – You **MUST** record the total number of fish in the catch category if Weight Method 4 – Visual Estimate or Weight Method 9 – Length/Weight conversion is used. Do not record the number of fish for weight method 13 – Tally Sample.
- **Hooks/Pots Sampled** – Record the number of hooks or pots that were tally sampled.
- **Weight Method** – Document the weight method used to estimate the catch category.

- 4 - Visual Estimate.
- 6 - Other
- 9 – Length/Weight Conversion
(Pacific halibut only)
- 13 – Tally sample.

- **Catch Purity** – Record as **P** – Pure if the catch category is 95% or greater a single species or as **M** – Mixed if the catch category is less than 95% a single species.
- **Discard Reason** – Record the skippers/crews reason for discard for unsampled (no species composition sample taken) discarded catch categories only.

1 - Prohibited– Only Salmon, Pacific Halibut, and Dungeness crab.

2 - Size – High-graded fish.

3 - Market – Any market driven reason such as size (too big or small), no market, market price is too low, etc.



TIP* Species which are unlikely to be retained, such as eelpouts, sculpins, and grenadiers are given a reason for discard of '3 - Market'.

4 - Regulation – Any regulatory reason including size, over quota, etc.

5 - Other – Document in comments actual reason for discard.



Tip* Invertebrates such as starfish, anemones, and sea pens are given a reason for discard of '5 - Other'.

6 – Drop-Off - Any fish that would have been retained if it were landed (fish did not make it onto the vessel because it fell off the line).

7 – Predation – Caught fish that are eaten by

- any predator including marine mammals, seabirds, or sand fleas.



Tip* Look only at the primary reason for discard. For instance, if the vessel is not retaining Starry Flounder and one drops-off, do not record the reason for discard as drop-off. Even if it had made it on the vessel, the fish would not have been retained. This also applies to predated fish that drop-off. If a fish that would have been retained drops off because it's been predated, the reason for discard should be predation (even if the fish made it aboard it would not have been retained due to predation).

- **Vessel Estimate** – This column is blank on fixed gear vessels.
- **Comments** – Document anything important about each catch category.
- **Keypunch Checks** – These are required field for Sample Weight, Numbers of fish, and Numbers of Hooks/Pots columns. Sum up the entries in each column and place the total in the corresponding keypunch box at the bottom of the form.

[illegible]

Figure 5 - 9: Fixed Gear Catch Form

VIII. Recording Fishing Effort Information and Total Catch Estimates

Fishing effort information must be recorded for every set a vessel makes while the Observer is on board. The fishing effort information is recorded on the Trip Form, which is separated into two sections:

- **Trip Form – Haul Locations**
- **Trip Form - Hauls**

Instructions for Trip Form

Trip Form – Haul Locations

During or after each set, you must document the set and retrieval times and the haul location and depth. Although fixed gear vessels are not required to keep Vessel Logbooks, most skippers will keep a personal log with haul location information. Ask the skipper to borrow this log to complete the Trip Form – Haul Locations. If the vessel does not record fishing effort information, the Observer must collect this information for every set.



TIP * It is important for Observers to complete the Trip Form - Haul Locations after each set.

- **Fishery Type** – Circle the fishery the vessel was participating in. If the vessel was participating in an EFP fishery, document the name of the EFP in the Trip Notes.
- **Trip Number** – This number is automatically generated by the database system. Complete this field once the trip has started to be entered into the database.



TIP* Some Observers find it easier to start a trip prior to leaving port. Doing this allows the Observer to fill in the Trip Number while at-sea rather than when the Observer returns to port.

- **Coast Guard Number** – Some limited entry and open access fixed gear vessels will have a six or seven digit USCG number. If the vessel does not have a USCG number, leave entry field blank and fill in the State Registration Number field.
- **Observer Name** – Record your first and last name.
- **Year** – Record the year as YYYY.
- **State Registration Number** – Use this field only if the fixed gear vessel does not have a USCG number. The state registration number will begin with a CF in California, OR in Oregon, and WN in Washington.
- **Vessel Name** – Record the full name of the vessel.
- **“WOC Groundfish Logbook” Number** - This field is left blank on all fixed gear vessels. If the vessel is keeping a Logbook, document the name and page number in the Trip Notes section.
- **Skipper First Name** – Record the first name of the skipper.

- **Skipper Last Name** - Record the last name of the skipper.
- **Departure Date/Time** – Document the date and time the vessel left port.
- **Departure Port** – Document the port the vessel departs from.
- **Landing Date/Time** – Document the date and time the vessel returns to port..
- **Landing Port** – Document the port the vessel returns to.
- **Fish Tickets Number** – Obtain the numbers of all landing receipts (fish tickets) from the vessel skipper, the port biologist, or the state liaison. **This is a required field for all fisheries and trips!**
- **Date** - Document the date in MM/DD of fish ticket issuance.
- **WOC** - The state agency code will be C - for California deliveries, O – for Oregon deliveries or W – for Washington deliveries.
- **Partial Trips** – Check the box if the vessel fished more days then were Observed.



TIP* Partial trips usually occur when the vessel day-fishes.

- **Total # of Fishing Days (Known)** – Document the total number of days the vessel fished before landing. This field is only completed when the trip is a partial trip.



TIP* Do not guess or make an assumption to complete this field. If you do not know how many days the trip lasted, leave column blank.

- **Trip Notes** – Document any information pertinent to understanding the trip.
- **Haul/Set Number** – Number hauls consecutively, starting with haul 1 for each trip. **Number the hauls in the order they were retrieved, not set!**



Tip * When there is more than one set in the water, pay attention to which set is being hauled (monitor buoys). Vessels often haul gear in a different order than it was set.

- **Start and End Date** – Document the date the haul was set and the date the haul was retrieved as MM/DD.
- **Start and End Time** – Document the Pacific Standard Time (PST) the haul was set and retrieved in 24-hour notation (military time). A haul starts when the first set of buoys is thrown from the vessel or when the first piece of gear goes into the water. The haul ends when the last hook or pot is brought aboard.
- **Start and End Latitude** – Document the location of the first buoy set as the start latitude. Document the location of the final buoy set as the end latitude. Record latitude in degrees, minutes, 1/100th of a minute.

Loran

If Observers are on a vessel that is using Loran C, document the Loran coordinates. Send these to the coordinator in an Excel spreadsheet and they will return the latitude and longitude positions.

Fathoms
1 fathom = 6 feet

- **Start and End Longitude** - Document the location of the first buoy set as the start longitude. Document the location of the final buoy set as the end longitude. Record longitude in degrees, minutes, 1/100th of a minute.

- **Depth** – Document the fishing depth in fathoms.

- **Gear Type** – Enter a code for the gear type based on the configuration of the gear. If the Observer is on a vessel using a type of fixed gear not listed, please contact a Coordinator or Debriefing for instructions.

6 – Longline or Setnet

7- Vertical Hook and Line Gear

10 – Fish Pot or Trap.

****If the vessel is not using one of the above gear types, this is most likely the wrong section of the manual. Please refer to Chapter 6 for other Fixed Gear types, Chapter 4 for Trawl, and Chapter 7 for Prawn Vessels. ****

- **Target Strategy** - Enter the vessel's target strategy. Please refer to Appendix E for a list of target strategies.

LE OA _EFP

Trip #

USCG #

State Registration # _____

Vessel Name _____

Logbook # _____

Skipper First Name _____

Skipper Last Name _____

Departure Date/Time _____

Departure Port _____

Landing Date/Time _____

Landing Port _____

Fish Ticket # Date WOC

 ☐

 ☐

 ☐

 ☐

 ☐

 ☐

Partial Trip ☐ Total # of Fishing Days (KNOWN)

Trip Notes:

TRIP FORM - HAUL LOCATIONS

Observer name _____ Year _____

Page _____ of _____

Haul/ Set #		DATE		TIME (24-hour clock)	LATITUDE		LONGITUDE		Depth of catch (fathoms)	Gear Type	Target Strategy
		Month	Day		Degrees	Minutes	Degrees	Minutes			
	Start					.		.			
	End					.		.			
	Start					.		.			
	End					.		.			
	Start					.		.			
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	Start					.		.			
	End					.		.			

Figure 5 -10: Trip Form – Haul Locations

Instructions for Trip Form – Hauls

- **Haul/Set Number** – Document the haul/set number that corresponds to the Haul Location information on the front of the form.
- **Observer Total Catch Estimate (OTC)** – Record the total catch estimate to two decimal places. Total catch estimate weight is recorded in pounds.

Determining OTC on Fixed Gear Vessels

There are only two ways to calculate OTC on fixed gear vessels.

Weight Method 11 – Retained + Discarded

This method is used when 100% of the gear is tally sampled.



$$\text{OTC} = \sum \text{All Catch Categories on Catch Form}$$

Weight Method 8 – Extrapolation

This method is used when less than 100% of the gear is tally sampled.



$$\text{OTC} = \frac{\sum \text{All Catch Category Weights on Catch Form} \times \text{Total \# Hooks in Set}}{\text{Number of Hooks Sampled}}$$

NOTE: When GEAR IS LOST, Weight Method – 8 Extrapolation must be used to calculate OTC in order to account for the unsampled (lost) gear.

- **Volume of Codend or Trawl Alley/Bin** – This field is blank on fixed gear vessels.

- **Density** – This field is blank on fixed gear vessels.
- **Weight Method** – Enter the number for the weight method used to obtain the Observer Total Catch estimate. The weight methods that may be used for fixed gear are:

11 – Retained + Discard –

When line is 100% tally sampled.

8 – Extrapolation –

When less than 100% of line is tally sampled.

Total Hooks/Pots

Always record the number of pots /hooks set, not retrieved in this column. If gear is lost, use gear performance code 5 and document how much gear is lost in the comments sections.

- **Total Hooks/Pots** – Document the total number of hooks/pots in the set. Be sure to record the amount of gear set, not retrieved!!
- **Gear Performance** – Record one of the following codes to document gear performance.
 - 1 - No problem.
 - 2 - Pot was in the haul.
 - 5 - Trawl net or codend lost, pot(s) lost, other gear lost. (If pots/hooks have been lost, document in the comments section how many were lost.)
 - 7 – Other problem – Document any other gear related problems in the comments section.
- **Beaufort Scale** – This is not a required field at this time. Do not fill in unless otherwise directed by program staff.
- **Comments** – Document any information that is important about the haul. If the vessel lost

gear, document the amount of gear lost in this column.

- **OTC Keypunch Check** – Add all of the OTC's for an entire trip and record total weight of trip in the OTC keypunch check box (If there is more than one Trip Form, add total catches of ALL hauls to obtain keypunch check.).
- **Total Hooks/Pots Keypunch Check** – Add all of the Hooks/Pots counts for an entire trip and record total hooks/pots count of trip in the Total Hook/Pot keypunch check box (If there is more than one Trip Form, add total hooks/pots counts of ALL hauls to obtain keypunch check.).

TRIP FORM - HAULS

Weight UM: LBS

Volume UM: M³Density UM: LBS/M³

Haul/ Set #	Observer Total Catch Estimate	Volume of Codend or Trawl Alley/Bin	Density	Weight Method	Total Hooks/ Pots	Gear Perf	Beaufort	Comments
Key- punch Check								

Trip Form v. 2 January 2003

Figure 5 - 11: Trip Form – Hauls

Unsampled Sets

Every set retrieved during a trip **MUST** have an OTC, even if it has not been sampled. For sets that are not sampled, employ a “sum of like sets” to determine OTC. Using a “sum of like sets” provides an estimation of catch based on sets from similar areas, depths, and times.

Never use the vessel’s estimate for OTC on a fixed gear vessel.

When estimating the OTC for an unsampled set, use more than one “like set” for the calculation. “Like sets” should be close in proximity, at the same depth, and of similar soak time as the unsampled set. In most circumstances, Observers will be able to use the sets just before and after their unsampled set. The lengths of the set or the number of hooks in the comparison sets do not need to be similar for the calculation of “like sets.”



$$\text{OTC of Unsampled set} = \frac{\text{Total wt of “like” set A} + \text{total wt of “like” set B}}{\text{Total \# of hooks in set A} + \text{total \# of hooks in set B}} \times \# \text{ hooks unsampled set}$$

IX. Trip Discard

On rare occasions, a vessel will discard fish from the hold. This happens if market conditions change during a trip or if they are catching larger fish that are worth more money. Discard that cannot be attributed to a specific haul is recorded on the Trip Discard Form.

The Trip Discard Form is not entered into the database system. Document the information from the Trip Discard Form (See Figure 5-11) in the Trip Comments on the Trip Page in the database.

- **Trip Number** – Record the trip number generated by the database system.
- **Coast Guard Number** – Record the six or seven digit USCG vessel number if the vessel has one. **If the vessel does not have a USCG number, leave entry field blank.**
- **Date** – Document the month and day that the trip discard took place.
- **Time** – Document the time, in Pacific Standard Time, that the trip discard took place.
- **Species** – Document the species that was discarded.
- **Weight** – Document the weight, in pounds, of species discarded.
- **# Of Fish** – Document the number of fish discarded.

- **Weight Method** - Document the weight method used to estimate the species weight.

1-Actual Weight

2-Bin/Trawl Alley Estimate

3-Basket Volume Determination

4-Visual Estimate

5-OTC-Retained

6-Other

7-Vessel Estimate

8-Extrapolation

- **Discard Reason** - Record the skipper's/crew's reason of discard for each species.

1-Prohibited – Only Salmon, Pacific Halibut, and Dungeness crab.

2-Size – High-graded fish.

3-Market – Any market driven reason such as size (too big or small), no market, market price is too low to retain.

4-Regulation – Any regulatory reason including size, over quota, etc.

5-Other – Document in comments actual reason for discard.

7-Predation – Caught fish that are eaten by any predator including marine mammals, other fish, seabirds, or sand fleas.

- **Comments** – Document any additional information that is important.

Trip Discard Form

Page ____ of ____

Trip Number					
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USCG #						
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[illegible]

Figure 5 - 12: Trip Discard Form

X. Examples

Longline Example

Official Total Catch Calculations

Gear Units
Sampled

15

Average Soak
Time/Gear Unit:

N/A

hooks/gear unit:

136

Retained

7 @ 57.82 lbs
 8 @ 71.96 lbs
 10 @ 86.91 lbs
 6 @ 53.84 lbs
 8 @ 61.43 lbs
 8 @ 72.34 lbs
 7 @ 52.16 lbs

562

Discarded

| (Drop-off)

Arrowtooth

|||||

15 @ 77.0lbs
(Market)

Starfish

|||||

11 @ 10.23 lbs

14 @ 55.0

|||||

Red-Banded

||

(Drop-off)

Spiny Dog

51

15 @ 60.74 lbs
(Market)

2 @ 5.5lbs

|||

Shortspine

|||

(Drop-off)

Skate
(Visual)

40	30	20
60	20	50
40	45	30
40	20	30

(Market)

P. halibut
(visual
length)

30	
40	
50	
60	I
80	
100	
110	

Total Hooks in Set = 15 skates X 136 Hooks = 2040 Hooks
 Skate

OTC = Retained + Discarded = 4813.82 lbs + 359.74 lbs + 406.87 lbs + 425 lbs = 6005.43 lbs

Haul #

0	1
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FIXED GEAR CATCH FORM*Page 1 of 2

Date		<table border="1" style="display: inline-table;"><tr><td>0</td><td>8</td><td>2</td><td>3</td><td>0</td><td>2</td></tr></table>	0	8	2	3	0	2	Trip Number		<table border="1" style="display: inline-table;"><tr><td></td><td></td><td>1</td><td>7</td><td>6</td></tr></table>			1	7	6	USCG #		<table border="1" style="display: inline-table;"><tr><td>1</td><td>0</td><td>6</td><td>8</td><td>3</td><td>6</td><td>1</td></tr></table>	1	0	6	8	3	6	1
0	8	2	3	0	2																					
		1	7	6																						
1	0	6	8	3	6	1																				

Catch #	R or D	Catch Category	Sample Weight	#'s of Fish Req. for wt. methods 4, 6, 9	# Hooks/Pots sampled by catch category	Weight Method	Catch Purity	Discard Reason	Vessel Estimate	Comments
1	R	ZMIS	4813.82		2040	13	M			
2	D	ZMIS	359.74			13	M			
3	D	PHLB	406.87	41		9	P	1		
4	D	SKAT	425	12	2040	4	P	3		
Keypunch Checks			6005.43	53	8160					

*Gear Types 6, 7, 8, 9, 10, 15, 16

January 2004

Fixed Gear Catch Form v. 4

Species Composition Measurements and Calculations

R or D	Catch Category	Density Samples	Measurements, Formulas, and Calculations	Total Weight
R	ZMIS 1		<p>Sablefish Ave Weights $\frac{456.46 \text{ lbs}}{54 \text{ fish}} = 8.452962962 \text{ lbs/fish}$ SABL wt - 562 fish X $\frac{8.452962962 \text{ lbs}}{\text{fish}} = 4750.565184 \text{ lbs}$</p> <p>Shortspine Thornyhead Ave Wts $\frac{5.5 \text{ lbs}}{2 \text{ fish}} = 2.75 \text{ lbs/fish}$ SSPN wt = 3 fish X 2.75lbs/fish = 8.25 lbs</p>	<p>SABL 562 @ 4750.57</p> <p>SSPN 3 @ 8.25</p>
D	ZMIS 2		<p>SABL weight (use retained ave wt) $8.452962962 \text{ lbs/ fish} \times 1 \text{ fish} = 8.452962962 \text{ lbs}$</p> <p>Arrowtooth Ave Wt $\frac{77.00 \text{ lbs}}{15 \text{ fish}} = 5.133333333 \text{ lbs/fish}$ ARTH wt = 22 fish X 5.133333333 lbs/fish = 112.9333333 lbs</p>	<p>SABL 1 @ 8.45</p> <p>ARTH 22 @ 112.93</p> <p>Redband 2 @ 7.86</p>
			<p>Redbanded RF weight (use retained ave wt) $\frac{55.0 \text{ lbs}}{14 \text{ fish}} = 3.928571428 \text{ lbs/fish}$ Redbanded wt = 2 fish X 3.928571428 lbs/fish = 7.857142856 lbs</p>	<p>Spiny Dog 51 @ 206.52</p> <p>SSPN 5 @ 13.75</p>
		<p>SKATE visuals</p> <p>40 + 60 + 40 + 40 + 30 + 20 + 45 + 20 + 20 + 50 + 30 + 30 = 425 lbs</p>	<p>Spiny Dogfish Ave Wt $\frac{60.74 \text{ lbs}}{15 \text{ fish}} = 4.049333333 \text{ lbs/fish}$ DSRK wt = 51 fish X 4.049333333 lbs/fish = 206.5159999 lbs</p> <p>Shortspine Thornyhead (used retained ave wt) 2.75 lbs/fish X 5 fish = 13.75 lbs</p>	<p>Skate = 12 @ 425.00</p>
		<p>PHLB</p> <p>30 - 5 X .57 lbs = 2.85 lbs 40 - 12 X 1.43 lbs = 17.16 lbs 50 - 2 X 2.95 lbs = 5.90 lbs 60 - 1 X 5.31 lbs = 5.31 lbs 80 - 16 X 13.51 lbs = 216.16 lbs 100 - 3 X 27.87 lbs = 83.61 lbs 110 - 2 X 37.94 lbs = 75.88 lbs</p>	<p>PHLB wt = 41 @ 406.87 lbs</p>	

Pot Example

Official Total Catch Calculations

Gear Units
Sampled

12 of 25

Average Soak
Time/Gear Unit:

N/A

hooks/gear unit:

Retained

10 @ 68.49 lbs
10 @ 68.07 lbs
10 @ 72.51 lbs

98

Sable

Grenadier

Tanneri
Crabs

Sea Whip

Starfish

2 @ 5.5lbs

Discarded

66

11 @ 49.11 lbs
3 @ 13.66 lbs
4 @ 17.83 lbs7 @ 27.85 lbs
(Market)11 @ 6.42 lbs
8 @ 4.81 lbs
(Market)

1 @ .33 lbs

2 @ .81 lbs

$$\text{OTC} = \text{Sum of Catch Categories} \times \frac{\text{\# of pots in set}}{\text{\# of pots sampled}}$$

$$\text{OTC} = 1025.19 \text{ lbs} \times \frac{25 \text{ pots}}{12 \text{ pots}} = 2135.8125 \text{ lbs}$$

FIXED GEAR CATCH FORM*

USCG #							
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Fixed Gear Catch Form v. 4

5-65

Species Composition Measurements and Calculations

R or D	Catch Category	Density Samples	Measurements, Formulas, and Calculations	Total Weight
R	ZMIS 1		Sablefish Ave Wts $\frac{209.07 \text{ lbs}}{30 \text{ fish}} = 6.969 \text{ lbs/fish}$ SABL wt - 98 fish X $\frac{6.969 \text{ lbs}}{\text{fish}} = 682.962 \text{ lbs}$	SABL 98 @ 682.96
D	ZMIS 2		Sable Ave Wts $\frac{80.60 \text{ lbs}}{18 \text{ fish}} = 4.477777777 \text{ lbs/fish}$ SABL wt = 66 fish X $4.477777777 \text{ lbs/fish} = 295.5333332 \text{ lbs}$ Grenadier Ave Wts $\frac{27.85 \text{ lbs}}{7 \text{ fish}} = 3.978571428 \text{ lbs/fish}$	SABL 66 @ 295.53 GREN 6 @ 23.87
			GREN wt = 6 fish X $3.978571428 \text{ lbs/fish} = 23.87142856 \text{ lbs}$ Tanneri T. Crab Ave Wts $\frac{11.23 \text{ lbs}}{19 \text{ fish}} = .591052631 \text{ lbs/fish}$ TCRB wt = 36 fish X $.591052631 \text{ lbs/fish} = 21.27789471 \text{ lbs}$	Tanneri 36 @ 21.28 Starfish 3 @ 1.215
			Starfish Ave Wts $\frac{.81 \text{ lbs}}{2 \text{ fish}} = .405 \text{ lbs/fish}$ STAR wt = 3 fish X $.405 \text{ lbs/fish} = 1.215 \text{ lbs}$	

